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Before the  
Federal Communications Commission  
Washington, D. C. 20554

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

In the Matter of

Revision of Part 22 of the Commission's  
rules governing the Public Mobile Services

CC Docket 91-140

92-115

ORIGINAL  
FILECOMMENTS

of Hatfield &amp; Dawson Consulting Engineers, Inc.

## INTRODUCTION

The firm of Hatfield & Dawson Consulting Engineers Inc. provides radio physics and telecommunications engineering services to a wide variety of clients, including licensees of the Federal Communications Commission ("Commission") under part 22 of the Rules. The firm is also a leading provider of engineering services to medium wave broadcasting stations. As a consequence, we feel that it is incumbent upon us to point out several shortcomings in proposed revisions of Part 22 by the Commission. Our comments are identified by the rule number of the proposed rule change.

§22.371

The proposed addition to the rules of a new section, 22.371, seeks to codify the policy which was expressed in Public Notices dated 8/11/87 and 11/14/89. The policy outlined in these two public notices has been in place, although frequently observed chiefly in the breach, for most of the last several decades. The requirements of the policy are directly related to the performance verification requirements which are the basis of the Commission's rules and policies for medium wave antenna systems.

These policies are, however, anachronistic. They are based upon the conceptual models of AM antennas that were established in the seminal technical analyses performed by engineers in the 1930's. These analyses were based on mathematical models that are relatively simple, straightforward, and intuitively reasonable. They are, however, oversimplifications, and throughout most of the last two or three decades, modern analytical techniques have been used to provide more exact solutions that conform to measured antenna performance. These efforts have now reached the point where traditional methods of performance verification are outmoded.

The requirements of the policy statement proposed to be codified in the revised Sec. 22.371 are an unreasonable burden on licensees because they are unnecessarily complex and expensive. They are so complex that many mobile services licensees fail to understand them, or have simply ignored them. We are aware of at least a dozen instances where mobile services licensees have constructed antenna towers without any regard whatsoever for the presence of nearby medium wave antennas. Some licensees appear to have adopted a practice of notifying nearby AM

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licensees by a telephone call that new construction was planned, without regard to the requirements of the policy for a measurement program. Some have refused to cooperate with the licensees of nearby medium wave stations even when the AM antenna has demonstrably been adversely affected by the construction of new antenna towers.

The planning process for a new mobile service site normally requires a careful analysis of coverage requirements and propagation conditions. In cellular systems the result of this process is a requirement for a facility whose flexibility is restricted in area. The presence of a nearby medium wave antenna system is normally not noted (if it is ever discovered at all by the mobile services licensee) until field inspection of the area or review of topographic maps. Mobile services licensees do not generally maintain copies of the Commission AM database to determine the distance of their proposed facilities from AM stations, and some are unaware of its existence, depending entirely upon field surveys and topographic maps to alert them to the presence of nearby AM stations.

It is our opinion, based upon our experience representing both medium wave broadcasting stations and mobile services licensees, that a completely different set of requirements should be enacted, which would allow greater flexibility and economy for mobile services licensees, as well as ensuring adequate measures to protect the performance of medium wave antenna systems.

The relevant physical parameters which can be used to determine potential re-radiation effects are the distance from the antenna array and the height of the reradiating structure in wavelengths. The fixed distance of 2 miles used in the present policy represents a distance of about 6 wavelengths at the low end of the medium wave band, and nearly 20 wavelengths at the high end of the "expanded" band (1.8 MHz). Structures which are less than about 0.1 wavelength tall are rarely substantial sources of re-radiation unless they are very close to an array and strongly illuminated by it. Structures more than 10 wavelengths from an array are rarely substantial re-radiators unless they are approximately 0.25 wavelength in height or higher.

Additionally, different medium wave antennas and antenna arrays have markedly different susceptibility to re-radiation effects. Arrays which have high gain and very deep minima are much more likely to be profoundly affected by re-radiation than are arrays with moderate directivity. It is obvious that erection of a re-radiator near a monitoring point for an array may have a profound effect on the monitor point measured field strength without necessarily compromising the far-field radiation pattern of the array. Potential re-radiators spaced more than a wavelength from an array may have profound parallax effects, and the resulting re-radiation may not appear at monitoring points while having substantial effects on other points along the measurement radial.

All of these factors lead us to suggest a rule that is somewhat more complicated, but which may have the beneficial effect of reducing uncertainty about the effects of new antenna structures for both public mobile service and broadcast licensees, and, hopefully, have the effect of reduction of costs to all parties as well.

The proposed rule would still allow the use of "before and after" partial proof measurements for those who choose that method as the most cost-effective procedure. For instances where new antenna tower proponents wish, however, the following procedure should be reasonable:

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I. An analysis using suitable numerical modeling techniques should be performed before the erection of a new structure which is (1) within 2 wavelengths of a medium wave antenna system, (2) more than 0.1 wavelengths tall within 4 wavelengths of such an antenna or array, or (3) more than 0.2 wavelengths tall within 8 wavelengths of such an array. If this analysis shows that the re-radiation will not result in the theoretical pattern far field exceeding the standard pattern (or exceeding 105% of the RMS value of an omnidirectional antenna), then before and after measurements at the monitor points should be taken to ensure that the monitor point limits are not exceeded as a result of the construction. If the monitor point limits are exceeded as a result of the construction, then a partial proof of performance on the affected monitor point radial should be performed.

II. If this radial partial proof measurement shows the radiation value of the antenna system on that radial exceeds the standard pattern requirement, then the licensee of the new structure should be required to be responsible for the necessary measures to eliminate the re-radiation. This can consist either of a readjustment of the array and complete partial proof of performance, or detuning or otherwise modifying the current distribution in the re-radiator. Suitable detuning can be demonstrated by return of the monitor points to values within the limits, or by a partial proof of performance on affected radial(s).

III. If the numerical analysis shows the proposed structure would produce re-radiation which would cause the standard pattern to be exceeded (or cause a departure from omnidirectionality of more than 5%, the proponent of the structure can (a) perform before and after partial proof of performance measurements, or (b) detune or otherwise modify the current distribution on the structure so that numerical analysis demonstrates compliance with the standard pattern or 5% omnidirectionality limitation. The election of option (b) requires the procedure outlined in paragraphs 1 and 2.

Reference should be made to a pending Petition for Notice of Inquiry, RM-7594, regarding AM directional antenna performance verification.

## §22.157

We strongly object to the adoption of rules for distance computation which are different among the various services regulated by the Commission. The distance between two points of the earth's surface is a constant. A method of suitable accuracy for the Commission's legitimate regulatory purpose should be specified at one location in the Rules, and referenced to it should be made at all other locations where necessary. Such reference can include reprinting the entire text of the method, if desirable.

## §22.159

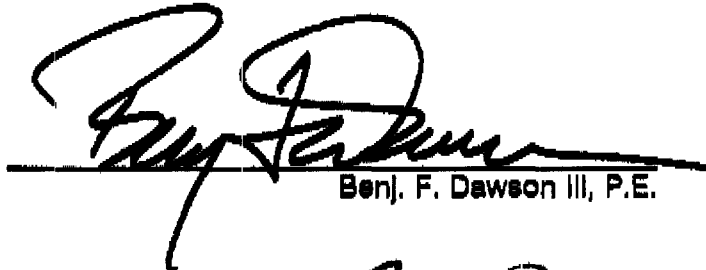
Although it is not precisely within the purview of part 22 of the rules, an effort should be made to make the computation of height of average terrain the same for all services. As things now stand, television computations extend to 16.1 km, while in other services 16 km is used. The provisions for determining exclusion of a radial are also inconsistent between the various services

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regulated by the Commission, and the staff in some services determines exclusion by considering the entire arc 22.5° either side of the radial rather than the radial itself. These inconsistencies serve no useful regulatory purpose, and therefore should be eliminated.

October 2, 1992

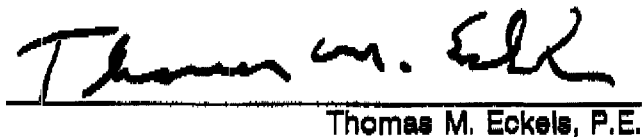
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